

# PUBLICLY AVAILABLE SPECIFICATION



**Maritime navigation and radiocommunication equipment and systems –  
VHF data exchange system – Requirements and methods of testing for stations  
including ASM functionality**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC online collection - [oc.iec.ch](http://oc.iec.ch)

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Preview generated by EVS

# PUBLICLY AVAILABLE SPECIFICATION



**Maritime navigation and radiocommunication equipment and systems –  
VHF data exchange system – Requirements and methods of testing for stations  
including ASM functionality**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 47.060; 49.090; 47.020.70

ISBN 978-2-8322-9438-3

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references .....	7
3 Terms, definitions and abbreviated terms .....	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms.....	8
4 General requirements and tests of equipment.....	9
4.1 Requirements (placeholder) .....	9
4.2 Methods of tests for general requirements .....	9
5 Performance requirements.....	9
5.1 Mobile station .....	9
5.1.1 Overview .....	9
5.1.2 General requirements .....	10
5.1.3 Technical requirements .....	11
5.2 Coast Station .....	23
5.2.1 Overview .....	23
5.2.2 General requirements .....	23
5.2.3 Technical requirements .....	23
5.3 AtoN Station .....	34
6 Methods of testing and required results .....	34
6.1 Mobile station .....	34
6.1.1 Test environment.....	34
6.1.2 Test signals .....	35
6.1.3 Environmental, power supply, special purpose and safety tests .....	35
6.1.4 Operational tests .....	36
6.1.5 Specific tests of physical layer.....	37
6.1.6 Specific tests of Link layer .....	45
6.1.7 Specific tests of Network layer.....	48
6.1.8 Specific tests of Transport layer.....	49
6.2 Coast station.....	49
6.2.1 Test environment.....	49
6.2.2 Test signals .....	50
6.2.3 Environmental, power supply, special purpose and safety tests .....	50
6.2.4 Operational tests .....	51
6.2.5 Specific tests of Physical layer .....	52
6.2.6 Specific tests of Link layer .....	60
6.2.7 Specific tests of Network layer.....	62
6.2.8 Specific tests of Transport layer.....	63
6.3 Tests for AtoN station .....	63
Annex A (normative) Presentation Interface (PI) sentences .....	64
A.1 General.....	64
A.2 AAB – ASM Selective Addressed Message .....	64
A.3 ABB – ASM Broadcast Message .....	65
A.4 ADM – Received ASM VHF Data-Link Message .....	66
A.5 ADO – ASM VHF Data-Link Own-Vessel transmission .....	67
A.6 AGB – ASM Geographical Multicast Message .....	67

A.7	AMK – Addressed and broadcast ASM message acknowledgement .....	69
A.8	ASM – ASM Message Assembly .....	69
A.9	ASQ – ASM Message Assembly Query .....	71
A.10	ACC – "ASM Coast Station Configuration command" .....	71
A.11	??? – "additional ASM Coast Station Configuration" .....	71
A.12	??? – "ASM Coast Station Status sentence" .....	72
	Bibliography .....	73
	Figure 1 – Slotted transmission spectrum for ASM .....	13
	Figure 2 – Transmitter power versus time characteristics for $\pi/4$ QPSK (ASM) .....	14
	Figure 3 – Slot selection Criteria Flow Chart .....	22
	Figure 4 – Slotted transmission spectrum for ASM .....	25
	Figure 5 – Transmitter power versus time characteristics for $\pi/4$ QPSK (ASM) .....	26
	Figure 6 – Slot selection Criteria Flow Chart .....	33
	Figure 7 – Test setup for frequency error measurement .....	37
	Figure 8 – Test setup for adjacent channel selectivity .....	41
	Figure 9 – Measurement arrangement for intermodulation .....	43
	Figure 10 – Measurement arrangement for blocking or de-sensitisation .....	44
	Figure 11 – Test setup for frequency error measurement .....	52
	Figure 12 – Test setup for adjacent channel selectivity .....	56
	Figure 13 – Measurement arrangement for intermodulation .....	58
	Figure 14 – Measurement arrangement for blocking or de-sensitisation .....	59
	Table 1 – Slotted transmission spectrum for ASM .....	12
	Table 2 – Transmitter power versus time characteristics .....	14
	Table 3 – Receiver requirements without FEC (using Link ID 1) .....	15
	Table 4 – IEC 61162 Talker Identifiers and Sentence Formatters used for input of data to Equipment for transmission to ASM VDL .....	16
	Table 5 – IEC 61162 Sentence Formatters used to output ASM VDL .....	16
	Table 6 – IEC 61162 Sentence Formatters used to output equipment status and input related commands .....	17
	Table 7 – Use of ASM VDL messages .....	18
	Table 8 – Message 0 description .....	19
	Table 9 – Quiet time multiplier .....	21
	Table 10 – Slotted transmission spectrum for ASM .....	24
	Table 11 – Transmitter power versus time characteristics .....	26
	Table 12 – Receiver requirements without FEC (using Link ID 1) .....	27
	Table 13 – IEC 61162 Talker Identifiers and Sentence Formatters used for input of data to Equipment for transmission to ASM VDL .....	28
	Table 14 – IEC 61162 Sentence Formatters used to output ASM VDL .....	28
	Table 15 – IEC 61162 Sentence Formatters used to output equipment status and input related commands .....	29
	Table 16 – Use of ASM VDL messages .....	30
	Table 17 – Message 0 description .....	31
	Table 18 – Quiet time multiplier .....	32

Table 19 – Power supply test schedule .....	36
Table 20 – Carrier power, required results .....	38
Table 21 – Used parameters and required results for ASM and VDE sensitivity tests .....	40
Table 22 – Used parameters and required results for ASM and VDE high input level tests .....	40
Table 23 – Additional channel combinations used for co-channel rejection tests .....	41
Table 24 – Test signals used for adjacent channel selectivity tests .....	42
Table 25 – Frequencies for inter-modulation test .....	44
Table 26 – Test signals used for inter-modulation test .....	44
Table 27 – Frequencies for blocking test.....	45
Table 28 – Test signals used for blocking test.....	45
Table 29 – Carrier power, required results .....	53
Table 30 – Used parameters and required results for ASM and VDE sensitivity tests .....	55
Table 31 – Used parameters and required results for ASM and VDE high input level tests .....	55
Table 32 – Additional channel combinations used for co-channel rejection tests .....	55
Table 33 – Test signals used for adjacent channel selectivity tests .....	56
Table 34 – Frequencies for inter-modulation test .....	58
Table 35 – Test signals used for inter-modulation test .....	58
Table 36 – Frequencies for blocking test.....	59
Table 37 – Test signals used for blocking test.....	60

Preview generated by EVS

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND  
SYSTEMS – VHF DATA EXCHANGE SYSTEM – REQUIREMENTS AND  
METHODS OF TESTING FOR STATIONS INCLUDING ASM FUNCTIONALITY**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

A PAS is an intermediate specification made available to the public and needing a lower level of consensus than an International Standard to be approved by vote (simple majority).

IEC PAS 63343 has been processed by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
80/975/DPAS	80/982/RVDPAS

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 2 years starting from the publication date. The validity may be extended for a single period up to a maximum of 2 years, at the end of which it shall be published as another type of normative document, or shall be withdrawn.

**IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**



# MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – VHF DATA EXCHANGE SYSTEM – REQUIREMENTS AND METHODS OF TESTING FOR STATIONS INCLUDING ASM FUNCTIONALITY

## 1 Scope

This document specifies technical requirements, methods of test and required test results for equipment implementing ASM part of the VHF Data exchange system (VDES) as defined in ITU-R M.2092.

This document is intended to be the first step of development of standard(s) describing equipment that implement functions of VDES in any combination.

NOTE All text of this document whose wording is identical to applicable external references such as ITU Recommendations is printed in *italics*, and the reference and associated paragraph numbers are indicated in brackets.

NOTE The intention of text written in notation [Future: text] in this document is to include future placeholder for topics that are considered important even for the first implementations that may comply with this document.

Requirements set in this document provide means to mitigate adverse interference to Automatic Identification System (AIS).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108 (all parts), *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS)*

IEC 61162-1:2016, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1 Single talker and multiple listeners*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61193-2:2007, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*

IEC 61993-2:2018, *Maritime navigation and radiocommunication equipment and systems – Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results*

IEC 62320-1:2015, *Maritime navigation and radiocommunication equipment and systems – Automatic identification system (AIS) – Part 1: AIS Base Stations – Minimum operational and performance requirements, methods of testing and required test results*

ITU-R Recommendation M.1371-5:2014, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band*

ITU-R M.2092-0:2015, *Technical characteristics for a VHF data exchange system in the VHF maritime mobile band*

ITU-T O.151:1992, *Error performance measuring equipment operating at the primary rate and above*

IALA G1139 Edition 3, 2019, *The Technical Specification of VDES*

### 3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1 Terms and definitions

##### 3.1.1 Input [verb]

**input [verb]**

used for data transaction towards the equipment in its Presentation Interface

##### 3.1.2 Output [verb]

**output [verb]**

used for data transaction from the equipment at its Presentation Interface

##### 3.1.3 Transmit [verb]

**transmit [verb]**

used when equipment transmits by using VHF radio

##### 3.1.4 Receive [verb]

**Receive [verb]**

used when equipment receives a radio signal

##### 3.1.5 VDES VDL

**VDES VDL**

AIS VDL, ASM VDL, VDE TER VDL and VDE SAT VDL

#### 3.2 Abbreviated terms

AIS	Automatic Identification System
ASM	Application Specific Message
BW	Bandwidth
DAC	Designated Area Code
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
EVM	Error Vector Magnitude
FATDMA	Fixed Access Time Division Multiple Access
FI	Function Identifier